

Running Head: TRANSACTIONAL RELATIONS AND AUTISM

**Parenting Stress and Child Behavior Problems in Young Children with Autism  
Spectrum Disorder: Transactional Relations across Time**

Yun-Nung Lin<sup>1</sup>, Lai-Sang Iao<sup>2</sup>, Yu-Han Lee<sup>3</sup>, Chin-Chin Wu<sup>1,4\*</sup>

Department of Psychology, Kaohsiung Medical University<sup>1</sup>

Department of Psychology, Nottingham Trent University<sup>2</sup>

Clinical Psychology Center, Ditmanson Medical Foundation, Chia-Yi Christian  
Hospital<sup>3</sup>

Department of Medical Research, Kaohsiung Medical University Hospital<sup>4</sup>

Corresponding Author: Chin-Chin Wu

[jinnchin@mail2000.com.tw](mailto:jinnchin@mail2000.com.tw)

### Abstract

This longitudinal study examined the transactional relations between parenting stress and both internalizing and externalizing behavioral problems in young children with autism spectrum disorder (ASD) over 1.5 years using a cross-lagged panel analysis. Participants included 75 young children with ASD (Time 1; mean age = 25.68 months) and their parents. Parenting stress that was related to parent's perceptions on child characteristics was found to predict **externalizing** behavioral problems in young children with ASD across two time points. However, behavioral problems in young children with ASD did not predict parenting stress. These findings provide implications for early intervention and family services for young children with ASD and their families.

**Keywords:** Autism Spectrum Disorder, Externalizing Behavioral Problems, Internalizing Behavioral Problems, Longitudinal Study, Parenting Stress

## Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by impaired social interaction and communication and repetitive interests or stereotyped behaviors (American Psychiatric Association [APA], 2013). Parents of children with ASD experience more parenting stress compared to parents of children with typical development (Estes et al., 2013; Giovagnoli et al., 2015; Hayes & Waston, 2013) and those with other disabilities (e.g., intellectual disability, Down syndrome; Craig et al., 2016; Estes et al., 2009; Hayes & Waston, 2013). Previous studies suggested that elevated parenting stress in parents of children with ASD or Fragile X is associated with negative outcomes, such as poor marital relationships (Benson & Kersh, 2011; Sim, Cordier, Vaz, & Falkmer, 2016), poor parental mental health (Benson & Kersh, 2011; Falk, Norris, & Quinn, 2014; Phetrasuwan & Shandor Miles, 2009), and low quality of life (Hsiao, 2016; Wheeler, Skinner, & Bailey, 2008). It is thus important to understand parenting stress in parents of children with ASD in terms of its predictors and their interactions over time in order to reduce its negative impacts.

Lazarus's (1993) theory of psychological stress proposed four elements in the stress process: (1) a causal event, (2) a cognitive appraisal of the event, (3) coping mechanisms, and (4) stress reactions. Considering parenting stress in parents of children with ASD as a stress reaction, there could be two possible causal factors: One is the severity of their children's autistic symptoms given its association with parenting stress (Falk et al., 2014; Osborne & Reed, 2009; Shawler & Sullivan, 2017) and the other is child behavior problems given that many individuals with ASD exhibit co-occurring behavioral problems (Bauminger, Solomon, & Rogers, 2010; Gau et al., 2010; Matson & Nebel-Schwalm, 2007), including internalizing and externalizing behavioral problems. Internalizing behavioral problems include emotional reactivity, anxious/depressed, somatic complaints, and withdrawal. Externalizing behavioral

problems include hyperactivity, impulsivity, and aggressive behavior. Both types of behavioral problems were found to be concurrently associated with parenting stress or distress in parents of children with ASD (Estes et al., 2013; Falk et al., 2014; Giovagnoli et al., 2015; Hayes & Watson, 2013; Hou, Stewart, Iao, & Wu, 2018; Lovell & Wetherell, 2016; Shawler & Sullivan, 2017; Weitlauf, Vehorn, Taylor, & Warren, 2014). More particularly, externalizing behavioral problems were considered as important contributors to parenting stress (Hou et al., 2018; Huang et al., 2014; Zaidman-Zait et al., 2017). However, these findings and suggestions were obtained from cross-sectional studies, which could not conclude the direction of the relations between parenting stress and behavioral problems in children with ASD. Thus, longitudinal studies are needed.

Lecavalier, Leone, and Wiltz (2006) employed a longitudinal design and showed that behavioral problems in 50 young people with ASD (originally aged 3–18 years) exacerbated parental stress over a 12-month period and vice versa. However, separate analyses for each outcome (i.e., parental stress and behavioral problems) were conducted so predictors of multiple outcomes and their interactions were not tested simultaneously. Using structural equation modeling (SEM) (i.e., cross-lagged panel analysis), Peters-Scheffer, Didden, and Korzilius (2012) examined transactional relations between maternal stress and child behavior problems in 104 mothers of children with ASD (originally aged 2–9 years) over a period of two years. Both maternal stress and child behavior problems were measured at three time points: baseline, 12 months after baseline, and 24 months after baseline. Their findings suggested the relations between maternal stress and child behavior problems were not bidirectional. More specifically, child behavior problems did not exacerbate maternal stress one year later, nor did maternal stress exacerbate child behavior problems over two years. However, one study suggested that parenting stress would exacerbate later child behavior problems. Totsika et al. (2013) examined the reciprocal relations between

maternal distress (e.g., well-being, psychological distress) and child behavior problems in 132 mothers and their children with ASD when they were 9 months, 3 years, and 5 years old. Their findings also demonstrated that the relations between maternal psychological distress and behavioral problems in children with ASD were not bidirectional. Although maternal psychological distress when children were 3 years old predicted child behavior problems two years later, child behavior problems did not predict maternal psychological distress.

In contrast to previous studies (e.g., Peters-Scheffer et al., 2012), Zaidman-Zait et al. (2014) found bidirectional relations between parenting stress and behavioral problems in children with ASD (originally aged 24–47 months). Parenting stress were measured using parenting distress and general distress subscales, from which Zaidman-Zait et al. (2011) selected some items from the Parenting Stress Index-Short Form (Abidin, 1995). Maternal stresses were measured at three time points: baseline, 24 months after baseline, and at 6 years of age. Children’s behavioral problems were also measured at three time points as follows: baseline, 12 months after baseline, and at 6 years of age. Children’s behavioral problems at 12 months after baseline predicted parenting stress (i.e., parenting distress) at 24 months after baseline, and parenting stress at 24 months after baseline predicted children’s behavioral problems at 6 years of age. Zaidman-Zait et al. also found that general stress in parents predicted children’s behavioral problems, but not vice versa. However, unlike previous studies (e.g., Peters-Scheffer et al., 2012), Zaidman-Zait et al. did not measure parenting stress and children’s behavioral problems simultaneously at each time point. This difference in designs could be one possible reason for the mixed results found in these studies (Peters-Scheffer et al., 2012; Totsika et al., 2013; Zaidman-Zait et al., 2014). Recently, Rodriguez, Hartley and Bolt (2019) measured parenting stress and behavioral problems in children with ASD (originally aged 5–12 years) simultaneously across four time

points at approximately 12 months interval over a 3-year period and reported bidirectional relations between parenting stress and child behavior problems. They found that parenting stress predicted both externalizing and internalizing behavioral problems in children with ASD. However, parenting stress was predicted by child's externalizing but not internalizing behavioral problems.

Therefore, the relations between parenting stress and child's behavioral problems have been mixed. Previous studies have showed nondirectional (Peters-Scheffer et al., 2012), unidirectional (Totsika et al., 2013), and bidirectional (Rodriguez et al., 2019; Zaidman-Zait et al., 2014) relations between parenting stress and behavioral problems in children with ASD. However, none of these studies has focused on examining the relations between parenting stress and behavioral problems in young children with ASD under the age of 3 years despite their importance for effective early intervention and family services. Moreover, most of these studies tested a wide age range of participants which may have masked different relationship patterns between parenting stress and behavioral problems in ASD at different developmental stages (Totsika et al., 2013). This study thus aimed to investigate the transactional relations between parenting stress and child behavior problems in **young children with ASD originally aged 18 months to 3 years old over 1.5 years**. In order to provide implications for effective early intervention and family services, we examined different domains of parenting stress (i.e., child-related domain, parent-related domain) and their independent relationships with child's behavioral problems in ASD. We also included the severity of children's autistic symptoms as a control given that it was associated with parenting stress (Falk et al., 2014; Shawler & Sullivan, 2017). Although child's behavioral problems were seen as a causal agent of parenting stress in previous cross-sectional studies (e.g., Giovagnoli et al., 2015; Hou et al., 2018) based on Lazarus's (1993) theory, longitudinal studies indeed showed that parenting stress predicted child's behavioral problems in

young children with ASD before 4 years old (Rodriguez et al., 2019; Totsika et al., 2013; Zaidman-Zait et al., 2014). Thus, we hypothesized that parenting stress would predict child behavior problems; however, child behavior problems might not predict parenting stress.

## **Methods**

### *Participants*

Ninety young children with ASD (mean age = 25.89 months, range = 18–42) and their parents were referred from the Interdisciplinary Assessment Center for Children with Suspected Developmental Delay (IACCSDD) of a teaching hospital, which provides services to children who are suspected of having developmental problems and their parents in the Southwest area of Taiwan. Fifteen (16.67%) of them dropped out at the follow-up assessment. As a result, a total of 75 young children with ASD (62 males, 13 females) were enrolled in this study. These children were between ages 18 and 35 months, except for one who was 42 months old. Accordingly, 75 parents (71 mothers, 4 fathers) of these children were also enrolled. Table 1 illustrates demographic information of all participants. These participants participated in the initial assessment (Time 1, T1; mean age = 25.68 months, range = 18–42 months) and the follow-up assessment after approximately 1.5 years (Time 2, T2; mean age = 43.99 months, range = 36–60 months). Sixty-eight (90.67%) of the children were diagnosed in accordance with the criteria from the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5; APA, 2013) by a multidisciplinary diagnostic team that comprised of two senior clinical child psychologists with doctoral degrees and two senior child and adolescent psychiatrists. According to the DSM-5 criteria for ASD, a child must exhibit a minimum of three deficits in the areas of social communication/interaction skills and two deficits in the areas of restricted/repetitive behaviors. These criteria were met based

on children's developmental history, current parental concerns, test results on cognitive and adaptive functioning, clinical observations, and results from the Autism Diagnostic Observation Schedule (ADOS; Lord, Rutter, DiLavore, & Risi, 1999). Given that some clinical professors still assess and diagnose individuals in accordance with the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR; APA, 2000) in Taiwan, an additional seven (9.33%) children who met the criteria for pervasive developmental disorder not otherwise specified (PDD-NOS) using the DSM-IV criteria were also included in the present study. Of the 75 young children with ASD, 53 (70.67%) children received occupational therapy, 47 (62.67%) had speech therapy, and 7 (9.33%) had physical therapy between T1 and T2.

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| Table 1 |
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### *Procedure*

Each participant was individually assessed using the ADOS (Lord et al., 1999). The ADOS was administered by a licensed clinical psychologist with a Ph.D. degree who had completed a training workshop of ADOS and received authorization by WPS to use it. Parents were asked to answer questionnaires for parenting stress and child behavior problems. All of the measures were collected at the time of the initial assessment (T1) and the follow-up assessment approximately 1.5 years later (T2). Parents received the diagnosis information of their child after assessment at T1.

### *Measures*

The Parenting Stress Index (PSI; Weng, 2003) was translated from the PSI established by Abidin (1990). The PSI is a parent-reported questionnaire that assesses



parenting stress in two domains: child and parent. The PSI child domain (PSI-CD) reflects stress arising from parents' report of child characteristics and can be divided into 6 subscales, as follows: adaptability, acceptability, demandingness, mood, distractibility and hyperactivity, and reinforcement. The PSI parent domain (PSI-PD) reflects stress arising from parent characteristics which constituted 7 subscales, including depression, attachment, restricted role, competence, isolation, spouse relationship, and health. Altogether, it contains 94 items on a 5-point Likert scale. Scores obtained from the two domains can be summed up to a PSI total score. Higher scores indicate greater parenting stress. Cut points (raw scores) for clinical levels of parenting stress on the PSI total, PSI-PD, and PSI-CD were 294, 165, and 135, respectively. The PSI had acceptable validity and moderate to good internal consistency, and the Cronbach's alphas for the PSI-CD and the PSI-PD were .91.

The Achenbach System of Empirically Based Assessment (ASEBA): Child Behavior Checklist for Ages 1½–5 (CBCL/1½–5; Achenbach & Rescorla, 2000) is a widely used questionnaire to assess behavioral and emotional problems. It has 99 items and uses a 3-point scale. The CBCL/1½–5 includes three main broadband scales: internalizing scale, externalizing scale, and total problem scale. Raw scores were converted to *T*-scores for the three main broadband scales. *T*-scores between 60 and 63 are considered to be borderline clinical range, and *T*-scores higher than 63 are considered to be clinical range. In consistence with the PSI, raw scores of the CBCL/1½–5 were used for the following statistical analyses. The internal consistency, test-retest reliability, and construct validity of the CBCL/1½–5 were .62–.95, .52–.84 and .37–.91, respectively, in a sample in Taiwan (Wu et al., 2012).

The ADOS (Lord et al., 1999) is a semistructured play-based and observational assessment that consists of four modules, each of which is selected and administered based on the age and expressive language of the child. It is thought to be the best

diagnostic tool for ASD because it serves as a standardized means by which communication, reciprocal social interaction, and stereotypic behaviors and restricted interests could be observed and scored. Though the ADOS-2 has already been released, there has not been a traditional Chinese version yet. Thus, the ADOS was used in this study under permission. All young children with ASD were administered with the Module 1 of the ADOS at T1. The ADOS total algorithm score was used to quantify the level of autistic symptomatology, and high scores indicate more severe symptoms.

### *Statistical Analysis*

Means and standard deviations of the ADOS scores, the PSI scores, and the CBCL/1½–5 scores at both time points were calculated. Pearson's correlation analyses were calculated with the Statistical Package for Social Sciences (SPSS 20.0 for Windows) to examine the associations among all variables in the study. Afterwards, we implemented cross-lagged structural equation modeling by using the 21<sup>st</sup> version of the Analysis of Moment Structures (AMOS; Arbuckle, 2012). Based on Kline's (2010) suggestion, the cutoff values of skewness and kurtosis were 3.0 and 8.0, respectively, to ensure univariate normality. All variables of skewness and kurtosis were between  $-.17$  and  $1.50$  and within the acceptable range. In addition, value of the multivariate kurtosis critical ratio was between  $-.45$  and  $1.32$  within the recommendation value of 5 (Byrne, 2010). As multivariate normality was confirmed, we used maximum likelihood estimation to examine the longitudinal models. The cross-lagged model provides information about synchronous correlations between two variables, autoregressive paths that reflect temporal stabilities of individual variables (e.g., from T1 to T2) and cross-lagged paths that indicate effects of a variable at T1 on another variable at T2. We first used the PSI total to investigate the interactions between total parenting stress and the two types of behavioral problems. Then, we examined relations

between different domains of parenting stress and the two types of behavioral problems. As mentioned earlier, the severity of children's ASD symptoms was included in all models as a control variable.

The fitness of the models to the data was assessed. A nonsignificant  $\chi^2$  indicates a satisfactory model fit (Tabachnick & Fidell, 2001). The root mean square error of approximation (RMSEA)  $\leq .05$  indicates an excellent fit, whereas values between .05 and .08 represent an acceptable fit (Brown, 2006). The Tucker-Lewis index (TLI) and the comparative fit index (CFI)  $\geq .95$  represent an excellent model fit, and TLI and CFI with values between .90 and .95 indicate an acceptable model fit. The standardized root mean square residual (SRMR)  $\leq .08$  represents a good model fit (Hu & Bentler, 1999).

## Results

Table 2 illustrates means and standard deviations for severity of ASD, parenting stress and child behavioral problems. For parenting stress, 19 (25.33%) parents at T1 and 21 (28%) parents at T2 reached clinical levels on the PSI total. Twenty-one (28%) parents at T1 and 18 (24%) parents at T2 reached clinical levels on the PSI-PD while 25 (33.33%) parents at T1 and 19 (25.33%) parents at T2 reached clinical levels on the PSI-CD. For child internalizing behavioral problems, 11 (14.67%) children at T1 and 16 (21.33%) children at T2 were found to be within borderline clinical range whereas 37 (49.33%) at T1 and 32 (42.67%) at T2 were within clinical range. For child externalizing behavioral problem, 14 (18.67%) children at T1 and 15 (20%) children at T2 were found to be within borderline clinical range while 21 (28%) at T1 and 17 (22.67%) at T2 were within clinical range.

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The correlations of variables in the study are presented in Table 3. The severity of ASD had no significant correlations with parenting stress and child behavior problems. Child behavior problems were significantly correlated with parenting stress at each time point and over time, except that the correlation between child's internalizing behavioral problems at T1 and the PSI-PD at T2 was not significant.

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| Table 3 |
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### The PSI Total and Child Behavior Problems

The standardized path estimates, and within-time correlations of the model of the PSI total and externalizing behavioral problems are showed in Figure 1. The cross-lagged model provided adequate fit to the data:  $\chi^2(1) = .99, p = .32, RMSEA = .00, TLI = 1.00, CFI = 1.00, SRMR = .03$ . As shown in Figure 1, the concurrent associations between the PSI total and externalizing behavioral problems at both times were significant. Stability effects for the PSI total and externalizing behavioral problems in the model were significant. We found one significant cross-lagged path: the effect of the PSI total at T1 on externalizing behavioral problems at T2. However, externalizing behavioral problems at T1 did not significantly predict the PSI total at T2. The severity of ASD did not have a significant effect on the PSI total at T2 (standardized path coefficient = .10,  $p = .17$ ). As presented in Figure 2, the values of autoregressive in the model of the PSI total and internalizing behavioral problems were similar to those in the model of the PSI total and externalizing behavioral problems; however, no significant cross-lagged effect was found in this model. It provided fair fit to the data:  $\chi^2(1) = .25, p = .61, RMSEA = .00, TLI = 1.07, CFI = 1.00, SRMR = .01$ . The severity of ASD did not have a significant effect on the PSI total at T2 in this model (standardized path coefficient = .12,  $p = .12$ ), either. These models indicated that

parenting stress predicted child's externalizing behavioral problems, and child's behavioral problems did not predict parenting stress.

Figure 1 and 2

### The PSI Parent Domain and Child Behavior Problems

The standardized path estimates and within-time correlations of the model of the PSI-PD and externalizing behavioral problems are presented in Figure 3. The cross-lagged model provided fair fit to the data:  $\chi^2(1) = .82, p = .37, RMSEA = .00, TLI = 1.02, CFI = 1.00, SRMR = .02$ . As illustrated in Figure 3, the concurrent associations between the PSI-PD and externalizing behavioral problems at both times were significant. Stability effects for the PSI-PD and externalizing behavioral problems in the model were also significant. However, no significant cross-lagged effect was found. The severity of ASD did not have a significant effect on the PSI-PD at T2 (standardized path coefficient =  $-.01, p = .96$ ). The values of autoregressive and cross-lagged paths in the model of the PSI-PD and internalizing behavioral problems were the same as those in the model of the PSI-PD and externalizing behavioral problems as presented in Figure 4. It also showed fair fit to the data:  $\chi^2(1) = .18, p = .68, RMSEA = .00, TLI = 1.10, CFI = 1.00, SRMR = .01$ . **The severity of ASD did not have a significant effect on the PSI-PD at T2 in this model (standardized path coefficient =  $.01, p = .90$ ), either.** These models indicated that parenting stress in the parent domain did not predict later child behavior problems, and child behavior problems did not predict later parenting stress in the parent domain, either.

Figure 3 and 4

## The PSI Child Domain and Child Behavior Problems

Figure 5 illustrates the standardized path estimates and concurrent associations of the model of the PSI-CD and externalizing behavioral problems. The fits of the cross-lagged model were good to fair:  $\chi^2(1) = .60, p = .44, RMSEA = .00, TLI = 1.03, CFI = 1.00, SRMR = .02$ . As depicted in Figure 5, the concurrent associations between the PSI-CD and externalizing behavioral problems at both times were significant. Stability effects for the PSI-CD and externalizing behavioral problems in the model were also significant. We also found one significant cross-lagged path: the effect of the PSI-CD at T1 on externalizing behavioral problems at T2. However, externalizing behavioral problems at T1 did not significantly predict the PSI-CD at T2. The severity of ASD significantly predicted the PSI-CD at T2 (standardized path coefficient = .19,  $p = .00$ ). The values of autoregressive in the model of the PSI-CD and internalizing behavioral problems were much the same as those in the model of the PSI-CD and externalizing behavioral problems; however, cross-lagged effect was insignificant ( $p = .06$ ) in this model as presented in Figure 6. It also provided good fit to the data:  $\chi^2(1) = .18, p = .67, RMSEA = .00, TLI = 1.05, CFI = 1.00, SRMR = .01$ . The severity of ASD also significantly predicted the PSI-CD in this model at T2 (standardized path coefficient = .21,  $p = .00$ ). These models indicated that parenting stress in the child domain predicted later externalizing behavioral problems. However, child behavior problems did not predict later parenting stress in the child domain.

Figure 5 and 6

## Discussion

Previous studies showed concurrent associations between parenting stress and behavioral problems in children with ASD (Estes et al., 2013; Hayes & Watson, 2013).

However, few studies examined the ongoing interactions among the related variables over time, especially for young children with ASD under 3 years old. In addition, parenting stress was divided into child-related stress (i.e., the PSI-CD) and parent-related stress (i.e., the PSI-PD) to help exploring how different domains of parenting stress and child behavior problems interact with each other.

The results of this study showed that there were concurrent associations between parenting stress and child behavior problems at each time point in the cross-lagged models, except that concurrent correlation between the PSI-PD and internalizing behavioral problems at T2 was not significant. Overall, the results indicated that the positive relations between parenting stress and child behavior problems are moderate and stable. However, autistic symptoms were not **concurrently** correlated with parenting stress **at T1**. This is consistent with Weitlauf et al. (2014) but inconsistent with Falk et al. (2014) and Shawler and Sullivan (2017), which could be explained by the different measurements that were used for autistic symptoms in these studies. Both Falk et al.'s and Shawler and Sullivan's studies used parent-reported questionnaires whereas Weitlauf et al.'s and our study used the ADOS. The lack of variability in our ADOS scores could also explain the lack of association between autistic symptoms and parenting stress. In addition, the stability effects for parenting stress in this study were significant over time. The findings were consistent with previous longitudinal studies in parents of children with ASD aged 2–18 years (Lecavalier et al., 2006; Peters-Scheffer et al., 2012; Totsika et al., 2013; Zaidman-Zait et al., 2014). Consistent with Zaidman-Zait et al.'s (2014) study, the stability effects of child behavior problems in this study were also significant over time. The findings suggested that parenting stress and child behavior problems are stable, which highlight the importance of early intervention for young children with ASD and their families.

Previous cross-sectional studies on the associations between parenting stress and

child behavior problems showed that child behavior problems were robust contributors to parenting stress (Giovagnoli et al., 2015; Huang et al., 2014; Lovell & Wetherell, 2016; Zaidman-Zait et al., 2017). However, cross-sectional studies could not sufficiently infer causal relations. Contrast to the cross-sectional studies, a few longitudinal studies showed that parenting stress was a predictor of child behavior problems in ASD no matter whether the relations between the two variables were bidirectional (Lecavalier et al., 2006; Zaidman-Zait et al., 2014) or unidirectional (Totsika et al., 2013). Consistent with Totsika et al. (2013), our findings indicated that the relations between parenting stress and behavioral problems in ASD were unidirectional (i.e., parenting stress predicted externalizing behavioral problems in young children with ASD over a 1.5-year period, but not vice versa). Therefore, parenting stress may be seen as a causal agent that elicits **child's externalizing behavioral problems** as a stress reaction rather than **child's externalizing behavioral problems** as a causal agent of parenting stress based on Lazarus's (1993) theory. However, it is also possible that our parents in Taiwan may have accepted their child's diagnosis and their role as a parent of a child with ASD after T1, which provided them the information about their child's diagnosis, and then developed coping strategies for stress by T2 (Chao, Chang, Chin, Li, & Chen, 2018). Hence, we did not find an effect of child behavior problems on parenting stress. However, further investigation is needed to test this speculation. Moreover, our findings did not exclude the possibility that child behavior problems may predict parenting stress at later developmental stages. Given that the current study focused on children with ASD under 3 years old and followed up after 1.5 years, we were not able to find the late effect of child behavior problems on parenting stress in children with ASD aged nearly 6 years old and beyond in both Zaidman-Zait et al. (2014) and Rodriguez et al. (2019).

The effect of early parenting stress on later child's externalizing behavioral



problems was found in young children with ASD under 3 years old in this study as well as in older children with ASD in previous studies (Rodriguez et al., 2019; Totsika et al., 2013; Zaidman-Zait et al., 2014). These findings suggested that high levels of parenting stress at an early developmental period may exacerbate child's externalizing behavioral problems later. More specifically, our findings indicated that it was child-related rather than parent-related parenting stress at T1 that predicted child's externalizing behavioral problems at T2. The more negative perception a parent had regarding his/her child characteristics, the more **child's externalizing behavioral problems** were reported later. Although this finding is inconsistent with Rodriguez et al. (2019), this inconsistency could be explained by the different developmental stages of children with ASD. Rodriguez et al. recruited school children with ASD aged 7 years while we recruited young children with ASD under the age of 3 years. Totsika et al. (2013) suggested that behavior problems did not show long-term effects on maternal well-being (e.g., psychological distress) of preschool children with ASD because mothers had not been exposed to these challenges long enough to experience adverse effects. The results of this study supported their findings.

Although further research is needed to verify our findings that child-related instead of parent-related parenting stress predicted **child's externalizing behavioral problems** in young children with ASD, these findings provide crucial implications to early diagnosis, assessment and intervention for young children with ASD and their families. First, consistent with previous Western studies (e.g., Mansell & Morris, 2004), Chao et al. (2018) suggested that parents in Taiwan would understand their child's problems more and experience less anxiety and uncertainty about their difficulties after a diagnosis of ASD was confirmed for their child. Therefore, early diagnosis is essential in helping parents understand their child's characteristics and decrease their anxiety and child-related stress which may in turn reduce their child's externalizing behavioral

problems.

Second, high ratings on the items of the PSI-CD such as “Child cries or fusses more often than other children” may not only indicate high child-related parenting stress but also reflect parents did not have the skills to manage their child’s behaviors, leading to more child externalizing behavioral problems. Parent training programs that teach parents to identify the antecedents and consequences of their child’s behaviors, to prevent child disruptive behaviors and to promote child compliance may reduce child disruptive and noncompliant behaviors (e.g., hyperactivity, irritability, socially inflexible; Bearss et al., 2015). Third, child-related parenting stress has to be assessed at an early stage so as to provide bespoke intervention and support to parents, e.g., teaching them adaptive strategies to cope with their child-related parenting stress as a priority. It was found that problem-focused coping strategies (e.g., active coping, planning, and acceptance) are protective factors between parenting stress and maternal mental health (Benson, 2010; Chen & Wu, 2017). Previous research also showed that parent-focused interventions could effectively decrease parenting stress in parents of young children who were newly diagnosed with ASD (Keen, Couzens, Muspratt, & Rodger, 2010; Zaidman-Zait et al., 2017).

The findings of this study also provide implications to future research. As mentioned earlier, high ratings on the PSI-CD items may reflect both high child-related parenting stress and low parenting skills, leading to more child externalizing behavioral problems. Shawler and Sullivan (2017) found that parental discipline strategies mediated the links between parenting stress and disruptive behavioral problems in children with ASD whereas Schiltz and colleagues (2018) suggested that parenting stress played the mediator between behavioral problems in youth with ASD and parenting behaviors. Therefore, it is still not clear how parenting stress, parenting behaviors, and child behavior problems interact with each other and future studies

should investigate the transactional relations between the three variables.

The current study has similar limitations as previous studies. First, the use of self-report scales might result in bias based on parents' subjective experience of their child. Thus, combining multiple sources of information or/and multiple data collection techniques (e.g., interviews, observation) should be considered in future studies. Second, mothers and fathers were not examined separately although there has been evidence suggesting that parenting stress for mothers and fathers were influenced by different aspects of children's behaviors (Davis & Carter, 2008; Falk et al., 2014). Future studies should examine whether mothers and fathers differ in the relations between parenting stress and behavioral problems. Finally, our sample size was less than ideal. Future studies should include a larger sample size to provide a more reliable conclusion.

### **Conclusion**

The purpose of this longitudinal study was to examine the transactional relations between parenting stress and child behavior problems in ASD. The results of this study showed that parenting stress predicted **child's externalizing behavior problems** in ASD. More particularly, parenting stress that was related to parent's perceptions on child characteristics was a significant predictor of **externalizing behavioral problems** in young children with ASD over 1.5 years. Hence, this study suggested that parenting stress would be assessed early and included in early intervention. Moreover, adjusting parental perceptions of child characteristics by promoting a better understanding and reforming children's behaviors would prevent later **externalizing** behavioral problems during early childhood.

## **Compliance with Ethical Standards**

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**Ethical Approval:** All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study was approved by the Ditmanson Medical Foundation Chia-Yi Christian Hospital Research Ethics Committee (CYCH-IRB102045).

**Informed Consent:** Informed consent was obtained from all individual participants included in this study

## Reference

- Abidin, R. R. (1990). *Parenting stress index* (3rd ed.). Charlottesville, VA: Pediatric Psychology Press.
- Abidin, R. R. (1995). *Parenting stress index: Professional Manual* (3rd ed.). Odessa, FL: Psychological Assessment Resource.
- Achenbach, T. M., & Rescorla, L. A. (2000). *Manual for the ASEBA preschool forms and profiles: An integrated system of multi-informant assessment*. Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families.
- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders*, 4th ed. revised. Washington, DC: American Psychiatric Association.
- American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders*, 5th ed. Washington, DC: American Psychiatric Association.
- Arbuckle, J. L. (2012). *IBM SPSS AMOS (Version 21.0) [Computer Program]*. Chicago, IL: IBM.
- Bauminger, N., Solomon, M., & Rogers, S. J. (2010). Externalizing and internalizing behaviors in ASD. *Autism Research*, 3(3), 101-112.
- Benson, P. R. (2010). Coping, distress, and well-being in mothers of children with autism. *Research in Autism Spectrum Disorders*, 4(2), 217-228.
- Benson, P. R., & Kersh, J. (2011). Marital quality and psychological adjustment among mothers of children with ASD: Cross-sectional and longitudinal relationships. *Journal of Autism and Developmental Disorders*, 41(12), 1675-1685.
- Bearss, K., Johnson, C., Smith, T., Lecavalier, L., Swiezy, N., Aman, M., ... & Sukhodolsky, D. G. (2015). Effect of parent training vs parent education on behavioral problems in children with autism spectrum disorder: A randomized clinical trial. *The Journal of the American Medical Association*, 313(15), 1524-1533.

- Brown, T. A., (2006). *Confirmatory factor analysis for applied research*. New York: Guilford.
- Byrne, B. (2010). *Structural equation modeling with AMOS* (2nd ed.). New York, NY: Routledge.
- Chao, K. Y., Chang, H. L., Chin, W. C., Li, H. M., & Chen, S. H. (2018). How Taiwanese parents of children with autism spectrum disorder experience the process of obtaining a diagnosis: A descriptive phenomenological analysis. *Autism*, 22(4), 388-400.
- Chen, S. J., & Wu, C. C. (2017). The mediation of coping behaviors in the relationships between parenting stress and depression, hopelessness, and quality of life among mothers of preschool children with autism spectrum disorders. *Journal of Education & Psychology*, 40(4), 63-90. (in Chinese)
- Craig, F., Operto, F. F., De Giacomo, A., Margari, L., Frolli, A., Conson, M.,...Margari, F. (2016). Parenting stress among parents of children with neurodevelopmental disorders. *Psychiatry Research*, 242, 121-129.
- Davis, N. O., & Carter, A. S. (2008). Parenting stress in mothers and fathers of toddlers with autism spectrum disorders: Associations with child characteristics. *Journal of Autism and Developmental Disorders*, 38(7), 1278-1291.
- Estes, A., Munson, J., Dawson, G., Koehler, E., Zhou, X. H., & Abbott, R. (2009). Parenting stress and psychological functioning among mothers of preschool children with autism and developmental delay. *Autism*, 13(4), 375-387.
- Estes, A., Olson, E., Sullivan, K., Greenon, J., Winter, J., Dawson, G., & Munson, J. (2013). Parenting-related stress and psychological distress in mothers of toddlers with autism spectrum disorders. *Brain and Development*, 35(2), 133-138.

- Falk, N. H., Norris, K., & Quinn, M. G. (2014). The factors predicting stress, anxiety and depression in the parents of children with autism. *Journal of Autism and Developmental Disorders, 44*(12), 3185-3203.
- Gau, S. S. F., Chou, M. C., Lee, J. C., Wong, C. C., Chou, W. J., Chen, M. F.,...Wu, Y. Y. (2010). Behavioral problems and parenting style among Taiwanese children with autism and their siblings. *Psychiatry and Clinical Neurosciences, 64*(1), 70-78.
- Giovagnoli, G., Postorino, V., Fatta, L. M., Sanges, V., De Peppo, L., Vassena, L.,...Mazzone, L. (2015). Behavioral and emotional profile and parental stress in preschool children with autism spectrum disorder. *Research in Developmental Disabilities, 45-46*, 411-421.
- Hayes, S. A., & Watson, S. L. (2013). The impact of parenting stress: A meta-analysis of studies comparing the experience of parenting stress in parents of children with and without autism spectrum disorder. *Journal of Autism and Developmental Disorders, 43*(3), 629-642.
- Hou, Y. M., Stewart, L., Iao, L. S., & Wu, C. C. (2018). Parenting stress and depressive symptoms in Taiwanese mothers of young children with autism spectrum disorder: Association with children's behavioural problems. *Journal of Applied Research in Intellectual Disabilities, 31*(6), 1113-1121.
- Hsiao, Y. J. (2016). Pathways to mental health-related quality of life for parents of children with autism spectrum disorder: Roles of parental stress, children's performance, medical support, and neighbor support. *Research in Autism Spectrum Disorders, 23*, 122-130.
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1-55.

- Huang, C. Y., Yen, H. C., Tseng, M. H., Tung, L. C., Chen, Y. D., & Chen, K. L. (2014). Impacts of autistic behaviors, emotional and behavioral problems on parenting stress in caregivers of children with autism. *Journal of Autism and Developmental Disorders, 44*(6), 1383-1390.
- Keen, D., Couzens, D., Muspratt, S., & Rodger, S. (2010). The effects of a parent-focused intervention for children with a recent diagnosis of autism spectrum disorder on parenting stress and competence. *Research in Autism Spectrum Disorders, 4*(2), 229-241.
- Kline, R. B. (2010). *Principles and practices of structural equation modeling*, (3rd ed.). New York: Guilford Press.
- Lazarus, R. S. (1993). From psychological stress to the emotions: A history of changing outlooks. *Annual Review of Psychology, 44*(1), 1-22.
- Lecavalier, L., Leone, S., & Wiltz, J. (2006). The impact of behavior problems on caregiver stress in young people with autism spectrum disorders. *Journal of Intellectual Disability Research, 50*(3), 172-183.
- Lord, C., Rutter, M., DiLavore, P. C., & Risi, S. (1999). *Autism diagnostic observation schedule (ADOS)*. Los Angeles, CA: Western Psychological Services.
- Lovell, B., & Wetherell, M. A. (2016). Behaviour problems of children with ASD and perceived stress in their caregivers: The moderating role of trait emotional intelligence? *Research in Autism Spectrum Disorders, 28*, 1-6.
- Mansell, W., & Morris, K. (2004). A survey of parents' reactions to the diagnosis of an autistic spectrum disorder by a local service: Access to information and use of services. *Autism, 8*(4), 387-407.



- Matson, J. L., & Nebel-Schwalm, M. S. (2007). Comorbid psychopathology with autism spectrum disorder in children: An overview. *Research in Developmental Disabilities, 28*(4), 341-352.
- Osborne, L. A., & Reed, P. (2009). The relationship between parenting stress and behavior problems of children with autistic spectrum disorders. *Exceptional Children, 76*(1), 54-73.
- Peters-Scheffer, N., Didden, R., & Korzilius, H. (2012). Maternal stress predicted by characteristics of children with autism spectrum disorder and intellectual disability. *Research in Autism Spectrum Disorders, 6*(2), 696-706.
- Phetrasuwan, S., & Shandor Miles, M. (2009). Parenting stress in mothers of children with autism spectrum disorders. *Journal for Specialists in Pediatric Nursing, 14*(3), 157-165.
- Rodriguez, G., Hartley, S. L., & Bolt, D. (2019). Transactional relations between parenting stress and child autism symptoms and behavior problems. *Journal of Autism and Developmental Disorders, 49*(5), 1887-1898.
- Schiltz, H. K., McVey, A. J., Magnus, B., Dolan, B. K., Willar, K. S., Pleiss, S.,...Van Hecke, A. V. (2018). Examining the links between challenging behaviors in youth with ASD and parental stress, mental health, and involvement: Applying an adaptation of the family stress model to families of youth with ASD. *Journal of Autism and Developmental Disorders, 48*(4), 1169-1180.
- Shawler, P. M., & Sullivan, M. A. (2017). Parental stress, discipline strategies, and child behavior problems in families with young children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 32*(2), 142-151.

- Sim, A., Cordier, R., Vaz, S., & Falkmer, T. (2016). Relationship satisfaction in couples raising a child with autism spectrum disorder: A systematic review of the literature. *Research in Autism Spectrum Disorders, 31*, 30-52.
- Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). Needham Heights, MA: Allyn & Bacon.
- Totsika, V., Hastings, R. P., Emerson, E., Lancaster, G. A., Berridge, D. M., & Vagenas, D. (2013). Is there a bidirectional relationship between maternal well-being and child behavior problems in autism spectrum disorders? Longitudinal analysis of a population-defined sample of young children. *Autism Research, 6*(3), 201-211.
- Weng, B. H. (2003). *Parenting Stress Index manual*. Taipei City, Taiwan, ROC: Psychological. (in Chinese)
- Weitlauf, A. S., Vehorn, A. C., Taylor, J. L., & Warren, Z. E. (2014). Relationship satisfaction, parenting stress, and depression in mothers of children with autism. *Autism, 18*(2), 194-198.
- Wheeler, A. C., Skinner, D. G., & Bailey, D. B. (2008). Perceived quality of life in mothers of children with fragile X syndrome. *American Journal on Mental Retardation, 113*(3), 159-177.
- Wu, Y. T., Chen, W. J., Hsieh, W. S., Chen, P. C., Liao, H. F., Su, Y. N., & Jeng, S. F. (2012). Maternal-reported behavioral and emotional problems in Taiwanese preschool children. *Research in Developmental Disabilities, 33*(3), 866-873.
- Zaidman-Zait, A., Mirenda, P., Zumbo, B. D., Georgiades, S., Szatmari, P., Bryson, S.,...Volden, J. (2011). Factor analysis of the Parenting Stress Index-Short Form with parents of young children with autism spectrum disorders. *Autism Research, 4*(5), 336-346.

Zaidman-Zait, A., Mirenda, P., Duku, E., Szatmari, P., Georgiades, S., Volden, J.,...Fombonne, E. (2014). Examination of bidirectional relationships between parent stress and two types of problem behavior in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 44(8), 1908-1917.

Zaidman-Zait, A., Mirenda, P., Duku, E., Vaillancourt, T., Smith, I. M., Szatmari, P.,...Zwaigenbaum, L. (2017). Impact of personal and social resources on parenting stress in mothers of children with autism spectrum disorder. *Autism*, 21(2), 155-166.

**Table 1** *Demographics of participants*

| Demographics                     | group                             |                                     |
|----------------------------------|-----------------------------------|-------------------------------------|
|                                  | Final samples<br>( <i>n</i> = 75) | Dropout samples<br>( <i>n</i> = 15) |
| <b>Children</b>                  |                                   |                                     |
| Boys (%)                         | 62 (82.67)                        | 15 (100)                            |
| Age (month) ( <i>SD</i> ) at T1  | 25.68 (5.04)                      | 26.93 (4.89)                        |
| Age (month) ( <i>SD</i> ) at T2  | 43.99 (4.90)                      | —                                   |
| <b>Parents</b>                   |                                   |                                     |
| Age (years) ( <i>SD</i> )        | 34.73 (6.09)                      | 34.47 (4.05)                        |
| Mothers (%)                      | 71 (94.67)                        | 14 (93.33)                          |
| Married (%)                      | 75 (100)                          | 15 (100)                            |
| Years of education ( <i>SD</i> ) | 14.64 (2.34)                      | 14.07 (2.69)                        |

**Table 2** Means and standard deviations (SD) for study variables

| Variables     | group                             |                                     |                                   |
|---------------|-----------------------------------|-------------------------------------|-----------------------------------|
|               | Total samples<br>( <i>n</i> = 90) | Dropout samples<br>( <i>n</i> = 15) | Final samples<br>( <i>n</i> = 75) |
| Time1         | <i>M</i> ( <i>SD</i> )            | <i>M</i> ( <i>SD</i> )              | <i>M</i> ( <i>SD</i> )            |
| ADOS severity | 16.20 (3.73)                      | 16.93 (2.79)                        | 16.05 (3.89)                      |
| PSI-PD        | 148.08 (23.97)                    | 144.93 (30.86)                      | 148.71 (22.55)                    |
| PSI-CD        | 126.53 (20.71)                    | 128.07 (19.82)                      | 126.23 (21.00)                    |
| PSI total     | 274.01 (40.69)                    | 273 (46.43)                         | 274.21 (39.79)                    |
| CBCL-INT      | 18.89 (10.33)                     | 18.07 (9.08)                        | 19.05 (10.61)                     |
| CBCL-EXT      | 20.31 (8.09)                      | 20.07 (8.08)                        | 20.36 (8.14)                      |
| Time 2        |                                   |                                     |                                   |
| PSI-PD        | —                                 | —                                   | 146.35 (25.85)                    |
| PSI-CD        | —                                 | —                                   | 122.68 (21.21)                    |
| PSI total     | —                                 | —                                   | 269.03 (40.67)                    |
| CBCL-INT      | —                                 | —                                   | 17.88 (10.31)                     |
| CBCL-EXT      | —                                 | —                                   | 18.39 (8.53)                      |

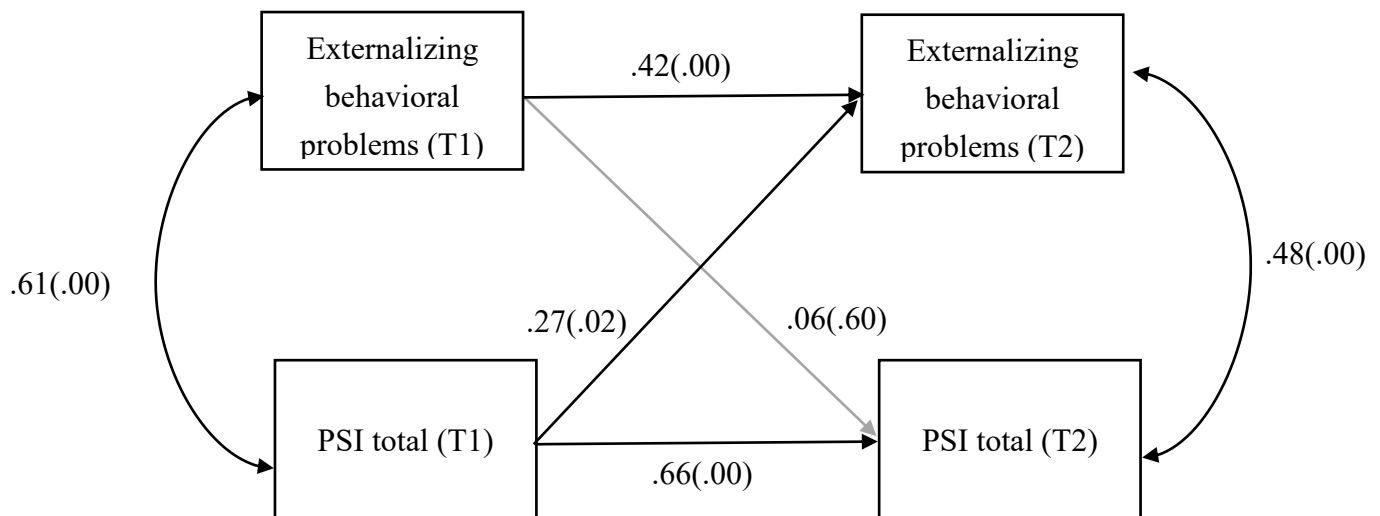
*Note.* ADOS = Autism Diagnostic Observation Schedule; CBCL-INT = Child Behavior Checklist Internalizing Problems; CBCL-EXT = Child Behavior Checklist Externalizing Problems; PSI = Parenting Stress Index; PSI-PD = Parenting Stress Index Parent Domain; PSI-CD = Parenting Stress Index Child Domain. The scores of the CBCL and the PSI are raw scores.

**Table 3** *Correlations among variables in all cross-lagged models in this study*

|                     | 1 | 2    | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    |
|---------------------|---|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1. T1 ADOS severity | — | -.10 | -.01  | -.08  | .04   | .01   | -.05  | .22   | .09   | .06   | .07   |
| 2. T1 PSI-PD        |   | —    | .55** | .91** | .27*  | .45** | .63** | .43** | .62** | .25*  | .39** |
| 3. T1 PSI-CD        |   |      | —     | .83** | .70** | .67** | .33** | .67** | .56** | .57** | .55** |
| 4. T1 PSI total     |   |      |       | —     | .51** | .61** | .57** | .61** | .68** | .45** | .53** |
| 5. T1 CBCL-INT      |   |      |       |       | —     | .72** | .18   | .55** | .40** | .65** | .50** |
| 6. T1 CBCL-EXT      |   |      |       |       |       | —     | .30** | .51** | .46** | .45** | .58** |
| 7. T2 PSI-PD        |   |      |       |       |       |       | —     | .49** | .89** | .26*  | .42** |
| 8. T2 PSI-CD        |   |      |       |       |       |       |       | —     | .83** | .69** | .75** |
| 9. T2 PSI total     |   |      |       |       |       |       |       |       | —     | .52** | .66** |
| 10. T2 CBCL-INT     |   |      |       |       |       |       |       |       |       | —     | .73** |
| 11. T2 CBCL-EXT     |   |      |       |       |       |       |       |       |       |       | —     |

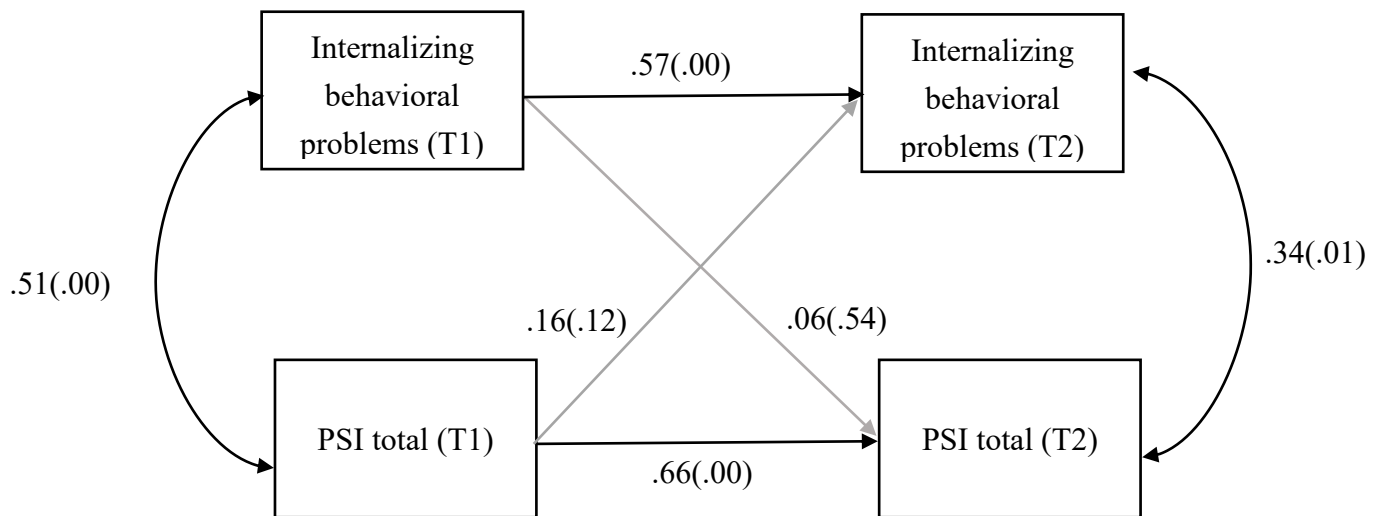
*Note.* ADOS = Autism Diagnostic Observation Schedule; CBCL-INT = Child Behavior Checklist Internalizing Problems; CBCL-EXT = Child Behavior Checklist Externalizing Problems; PSI = Parenting Stress Index; PSI-PD = Parenting Stress Index Parent Domain; PSI-CD = Parenting Stress Index Child Domain.

\* $p < .05$ ; \*\* $p < .01$ .



**Figure 1.**

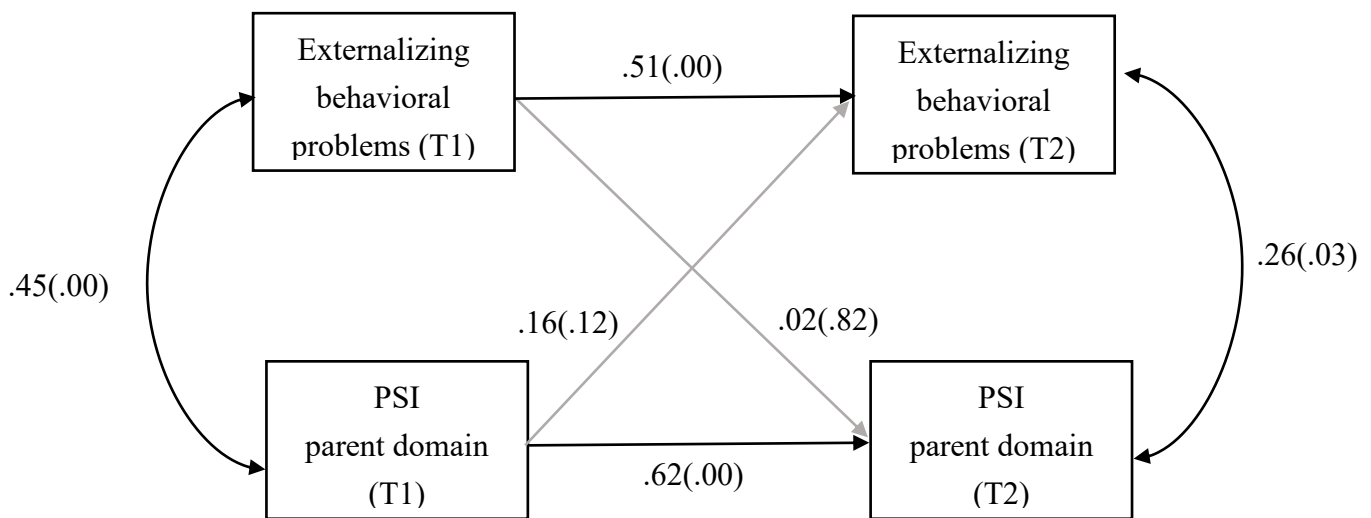
Cross-lagged model of the longitudinal relations between the PSI total and externalizing behavioral problems with standardized coefficients after controlling for severity of ASD. Significant paths are presented in bold. See text for control variable effects. PSI = Parenting Stress Index.



**Figure 2.**

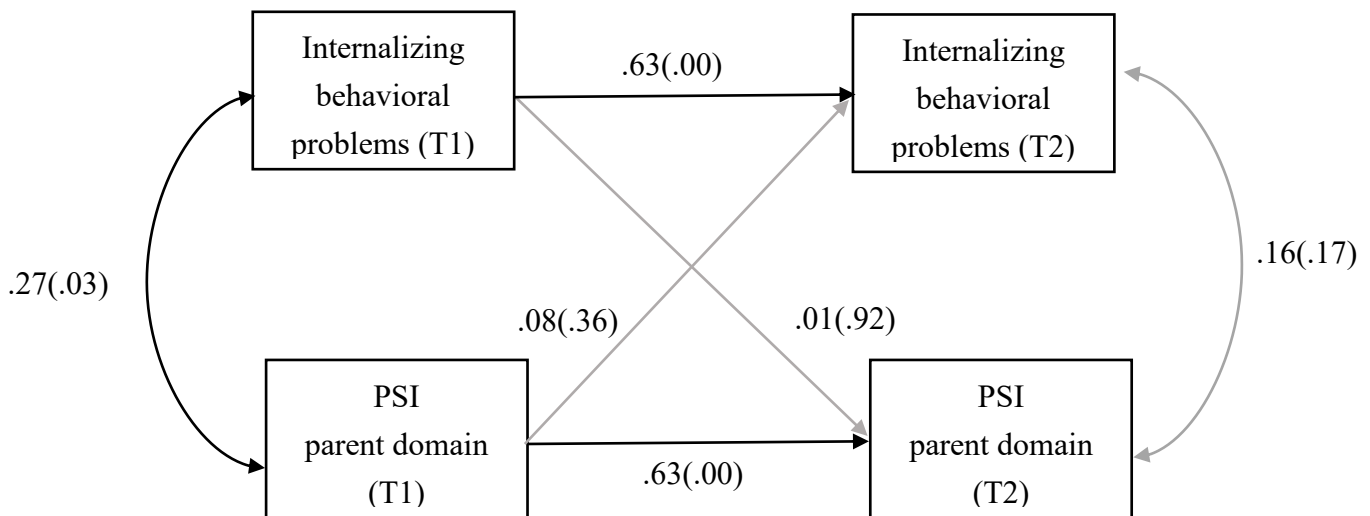
Cross-lagged model of the longitudinal relations between the PSI total and internalizing behavioral problems with standardized coefficients after controlling for severity of ASD. Significant paths are presented in bold. See text for control variable effects. PSI = Parenting Stress Index.





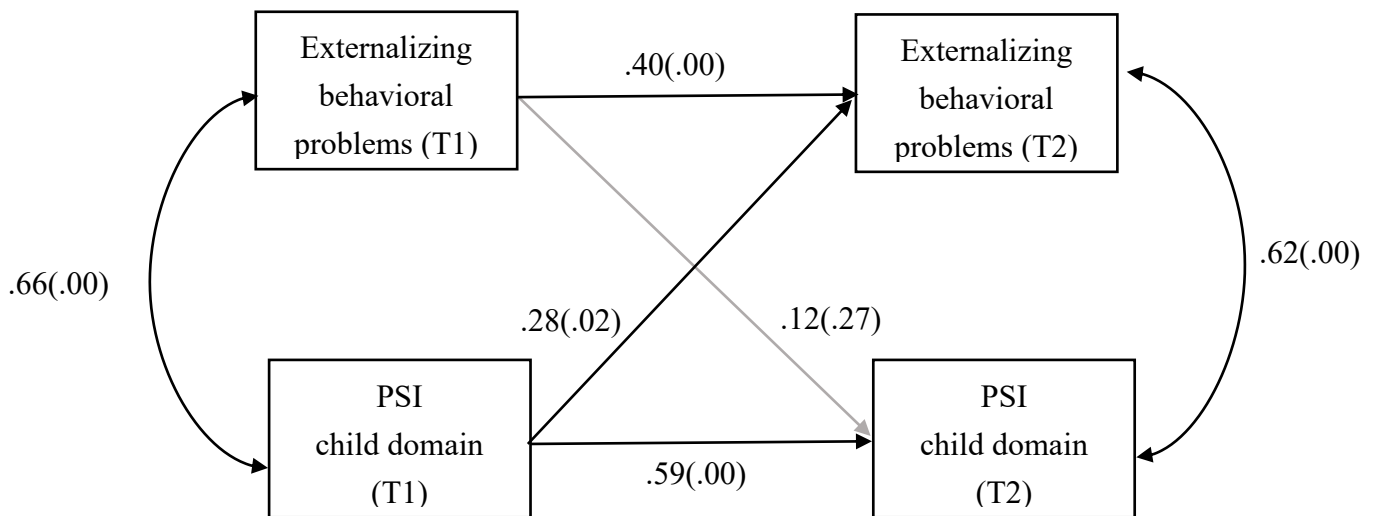
**Figure 3.**

Cross-lagged model of the longitudinal relations between the PSI parent domain and externalizing behavioral problems with standardized coefficients after controlling for severity of ASD. Significant paths are presented in bold. See text for control variable effects. PSI = Parenting Stress Index.



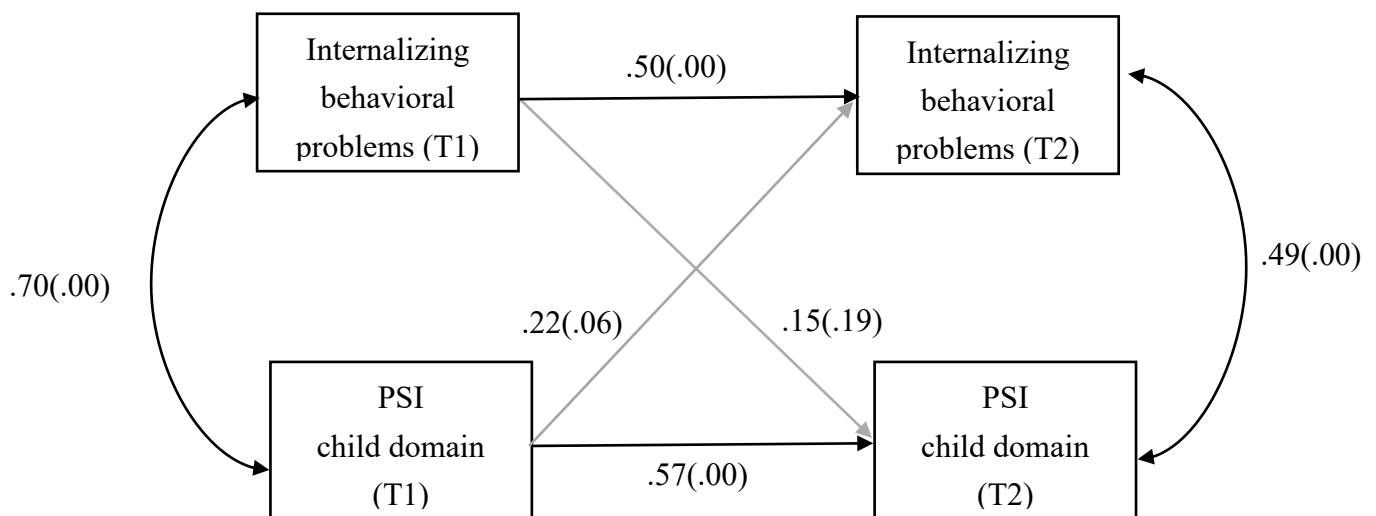
**Figure 4.**

Cross-lagged model of the longitudinal relations between the PSI parent domain and internalizing behavioral problems with standardized coefficients after controlling for severity of ASD. Significant paths are presented in bold. See text for control variable effects. PSI = Parenting Stress Index.



**Figure 5.**

Cross-lagged model of the longitudinal relations between the PSI child domain and externalizing behavioral problems with standardized coefficients after controlling for severity of ASD. Significant paths are presented in bold. See text for control variable effects. PSI = Parenting Stress Index.



**Figure 6.**

Cross-lagged model of the longitudinal relations between the PSI child domain and internalizing behavioral problems with standardized coefficients after controlling for severity of ASD. Significant paths are presented in bold. See text for control variable effects. PSI = Parenting Stress Index.